A PRELIMINARY SURVEY OF LICHENS FROM CORBETT NATIONAL PARK[1]

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(*With three text-figures*)

Key words: Lichen, epiphytic, Corbett National Park

The paper enumerates 69 species representing 21 genera of lichens found growing on different tree species in seven forest sites in Jim Corbett National Park, Uttar Pradesh, India. It also includes a comparative account of lichens growing on different phorophytes. The crustose lichens exhibit dominance on trees.

Introduction

Corbett National Park was established on 8th August, 1936 and happens to be the oldest National Park of the Indian subcontinent. The park is located between 29° 13' and 29° 35' N lat., and between 78° 46' and 79° 33' E long., spread over an area of 1318.54 sq. km. It is situated in the foothills of Himalayas, mainly in the districts of Pauri Garhwal and Naini Tal. The park contains two protected areas within its precincts, namely Corbett National park (CNP) 520.82 sq. km and Sonanadi Wild Life Sanctuary (WLS) 301.18 sq. km.

As the park lies in the Shivalik-terai biotic province abutting the Himalayas, it has great habitat diversity. The northern side of the park is bounded by mountains of outer Himalayas, while the drier Shivalik range lies on the south. The rainfed Ramganga river enters the park at Marchula, and before emerging out of the park at Kalagarh, Mandal, Palain and Sonanadi are its main tributaries. Construction of a dam across the Ramganga at Kalagarh led to the formation of a large man-made reservoir spread over an area of 82 sq. km.

Vegetation: *Acacia catechu* (Khair) and *Dalbergia latifolia* (Sissu) forest thrive in riverine areas, while *Shorea robusta* forests are found on hilly slopes and ridges. About one tenth of the park has open grasslands. Dhikala, Paterpani, Kinnanauli, Bijrani and Jhirna are some of the important grasslands of the park.

The common associates of *Shorea robusta* are evergreen species of *Mallotus philippensis* and *Syzygium cumini.* The other small to medium sized trees are *Phoebe lanceolata, Litsea glutinosa, L. monopetala, Drypetus roxburghii* and *Boehmeria rugulosa. Murraya, Mangifera indica* and *Citrus medica* grow in mixed and pure patches.

Among the deciduous species, *Terminalia alata, T. chebula, Semecarpus anacardium, Lannea coromandelica, Sapium insigne,* and *Lagerstroemia parviflora* are common at Dhikala, Bijrani, and Malani. Paterpani also harbours *Acacia catechu, Holoptelea integrifolia* and *Phyllanthus emblica. Dalbergia sissoo* occupies large patches in Dhikala and Paterpani. *Bischofia javanica, Firmiana pallens* and *Ficus* species are very common in Sultan. Shrubs or small trees of *Murraya koenigii* are scattered throughout the park.

Pant (1987) enumerated 594 species of angiosperms, and 22 ferns and fern allies from the park. The cryptogamic flora, however, have not received adequate attention so far.

Material and Methods

In this study, seven forest localities (Bijrani, Malani, Dhikala, Jhirna, Chuhi, Sultan

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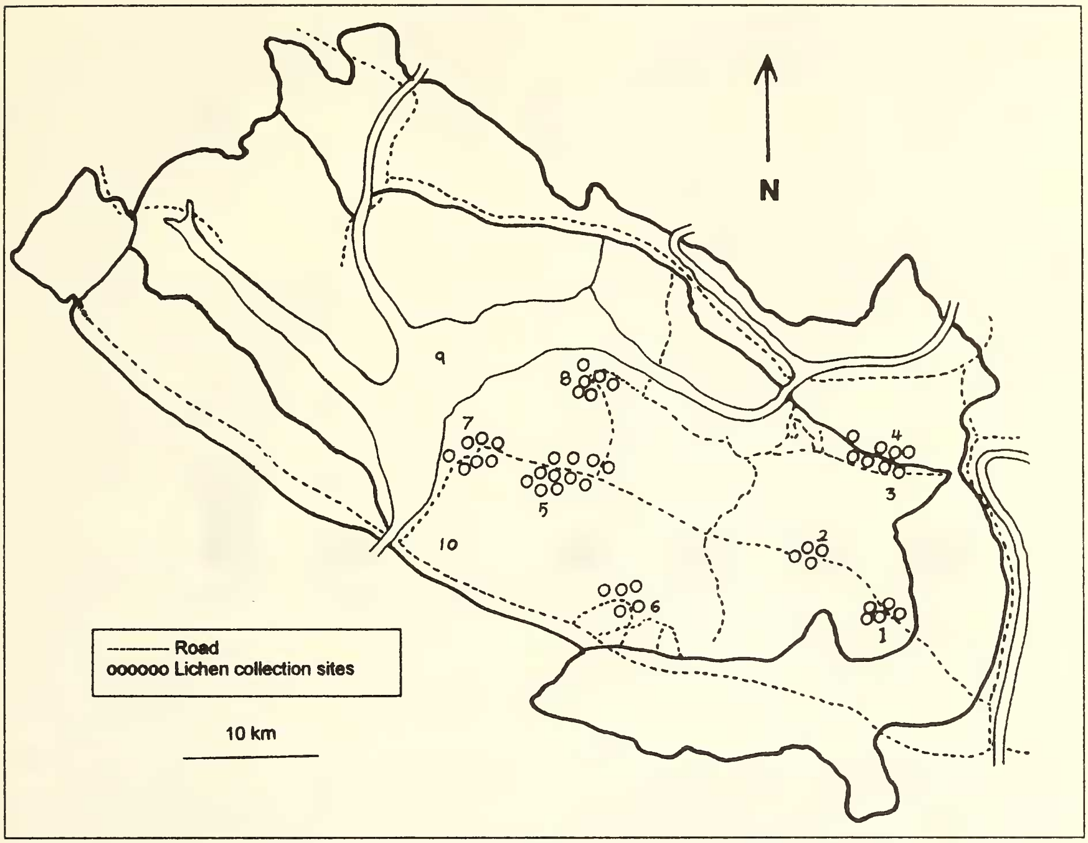

Fig. 1: Map showing Lichen collection sites in Corbett National Park
1. Bijrani; 2. Malani; 3. Dhangari; 4. Sultan; 5. Paterpani; 6. Jhirna; 7. Saddle Dam; 8. Dhikala; 9. Ramganga Reservoir; 10. Kalagarh

and Paterpani) in the core zone of the park were surveyed (Fig. 1) and about 300 lichen specimens were collected, growing over trees of *Syzygium cumini, Mallotus philippensis, Murraya koenigii, Mangifera indica, Shorea robusta, Terminalia arjuna* and *Toona ciliata,* and on sandstone and other rocks.

The specimens were studied anatomically, morphologically and chemically. They are now preserved in the lichen herbarium of the National Botanical Research Institute (LWG).

RESULTS AND DISCUSSION

A total of 69 species representing 21 genera of lichens were found growing on trees, sandstone and other rocks in the area surveyed. There is dominance of crustose form of lichens, in all the seven forest sites (Fig. 2) represented by 62 species, while only 7 foliose species of three genera *Dirinaria, Parmelia* and *Physcia* were found on *Syzygium cumini, Murraya koenigii, Shorea robusta* and *Terminalia arjuna* in the moist area of Malani, Sultan, Paterpani and Chuhi.

Syzygium cumini trees, the most common associates of *Shorea robusta* in moist places along streams, harbour 45 epiphytic species, while *Shorea robusta, Mallotus philippensis* and *Murraya koenigii* bear 15, 7 and 8 lichen species respectively (Tables 1-4).

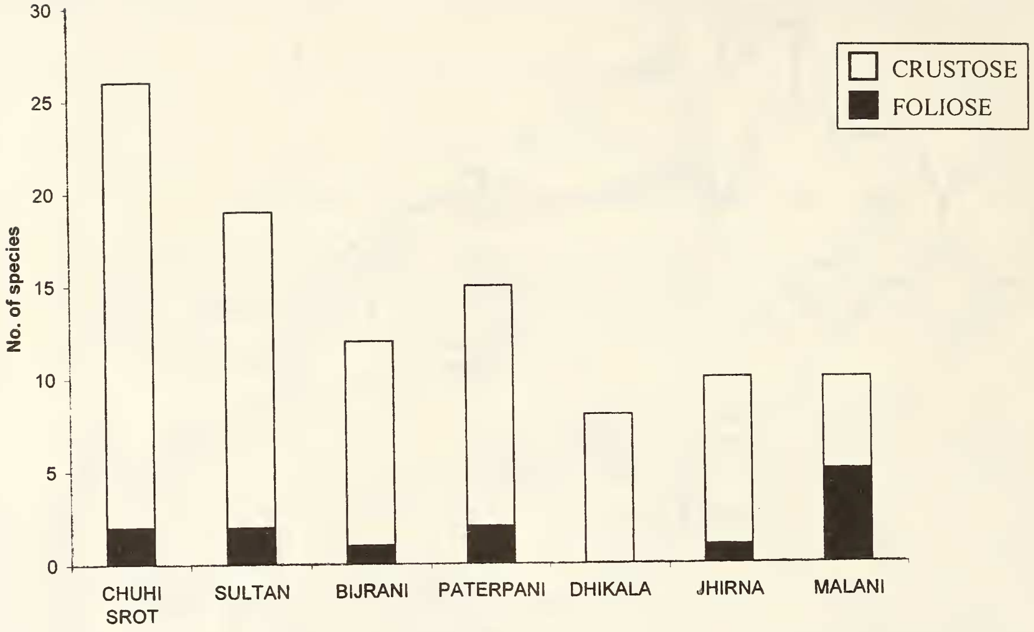

Fig. 2: Growth form types of lichens in different forest sites of Corbett National Park

An orange-yellow crustose lichen *Brigantiaea leucoxantha,* commonly grows on *Syzygium cumini,* in moist and also dry places in the park, while on trees in moist, damp, shaded areas, along the stream, the pyrenocarpous lichen *Pyrenula* dominates with seven species. Chuhi Srot and Sultan areas have the maximum diversity of epiphytic lichens on *Syzygium cumini,* as represented by 23 and 18 species respectively (Table 1). *Syzygium* trees in more or less dry areas of Malani, Jhirna and Dhikala bear only 2, 3 and 5 lichen species respectively.

Trees of *Shorea robusta* bear 15 epiphytic species of lichen. Young trees of *Shorea robusta* have smooth and soft bark, preferred by the crustose species *Lecanora cinereofusca, L. pulicaris* and *Chrysothrix candelaris* in Malani and Paterpani areas. In mature *Shorea robusta* trees, the bark is thick and rough. Mature trees in dry places show poor growth of a few crustose lichens like *Bacidia, Caloplaca* and *Pertusaria,* while at moist, shady places they bear foliose lichen genera *Parmelia* and *Leptogium.*

It is interesting to note that decaying logs of *Shorea robusta* in moist places of Malani area have a luxuriant growth of both crustose (*Brigantiaea* and *Buellia*) and foliose (*Parmelia, Dirinaria* and *Physcia*) species.

Mallotus philippensis trees have hard wood, with a thin, smooth, upper surface, preferred by only a few pyrenocarpous and graphidaceous genera. The trees exhibit no growth of foliose lichens. Due to its smooth bark, *Mallotus philippensis* shares 4 and 2 common epiphytic species with *Syzygium cumini* and *Murraya koenigii* respectively, whereas it does not share any species with the thick, rough barked *Shorea robusta* (Fig. 3).

Murraya koenigii, an evergreen shrub or small tree, with smooth bark on the trunk, is scattered throughout the park. It is common in more or less dry, open areas of Paterpani, and Jhirna area, and bears 8 species, of which two are

TABLE 1
LICHENS ON *SYZYGIUM CUMINI* IN CORBETT NATIONAL PARK

Sl. No.	Lichen species	Location
1.	*Arthonia impolitella* Nyl	C
2.	*A. medusula* (Pers.) Nyl.	C
3.	*A. radiata* (Pers.) Nyl.	C
4.	*A. subgyrosa* Nyl.	S
5.	*Arthonia* sp.	B
6.	*Bacidia covexula* (Müll. Arg.) Zahlbr.	S
7.	*B. medialis* (Tuck. in Nyl.) Zahlbr.	B, D, P
8.	*B. nigrofusca* (Müll. Arg.) Zahlbr.	P, J
9.	*B. rufescens* (Müll. Arg.) Zahlbr	P
10.	*Brigantiaea leucoxantha* (Sprengel) R. Sant & Haf. in Haf. & Ballem	B, S, D, C
11.	*Caloplaca subnigricans* Magn.	C
12.	*Chrysothrix candelaris* (L.) Laudon	C
13.	*Cryptothecia lunulata* (Zahlbr.) Makh. & Patw.	B, S, P, C
14.	*Dirinaria aegialita* (Afr. in Ach.) Moore	S
15.	*D. confluens* (Fr.) Awasthi	M
16.	*Graphina* cfr. *cleistoblephara* (Nyl.) Zahlbr.	D, C
17.	*G.* cfr. *dimorphodes* (Nyl.) Zahlbr.	B
18.	*Graphis divaricoides* Räsänen	C
19.	*G. implexula* Stirton	C
20.	*G. nakanishiana* Pat. & Kulk.	B, S, P, C
21.	*G. nigroglauca* Leighton	C
22.	*G. subashinae* Nagarkar & Patw.	C
23.	*G. scripta* (L.) Ach.	B, P, C
24.	*Lecanora cinereofusca* H. Magn.	J
25.	*L. fimbriatula* Stirton	S
26.	*L. perplexa* Brodo	B, C
27.	*Lecidea* sp.	S, C
28.	*Opegrapha inaequalis* Feé	P
29.	*O. rufescens* Pers.	S
30.	*O. vulgata* Ach.	S
31.	*Parmelia saccatiloba* Taylor	C
32.	*Pertusaria himalayensis* Awasthi & Srivastava	P, C
33.	*P. depressa* (Feé) Mont & v.d. Bosch.	C
34.	*P. leioplacella* Nyl.	S, J
35.	*P. punctata* Nyl.	S
36.	*Physcia clementei* (Sm. in Sm. & Sorv.) Lynge	M
37.	*Phaeographis instrata* (Stirton) Zahlbr.	C
38.	*P. subdividens* (Leighton) Müll. Arg.	C
39.	*Pyrenula aspistea* (Ach.) Ach.	S
40.	*P. conspercata* Müll. Arg.	B
41.	*P. immersa* Müll. Arg.	S
42.	*P. immissa* (Stirton) Müll. Arg.	S
43.	*P. introducta* (Stirton) Zahlbr.	S
44.	*P. mastophorizans* Müll. Arg.	S
45.	*P. sublaevigata* (Patw. & Makh.) Upreti	S

B: Bijrani, C: Chuhi, D: Dhikala, J: Jhirna, M: Malani, P: Paterpani, S: Sultan.

TABLE 2
LICHENS ON *SHOREA ROBUSTA* IN CORBETT NATIONAL PARK

Sl. No.	Lichen species	Location
1.	*Bacidia* cfr. *laurocerasi* (Delise ex Duby) Ozenda & Clauz	D
2.	*Brigantiaea leucoxantha* (Sprengel) R. Sant & Haf in Haf & Bellem	P
3.	*Buellia curtisii* (Tuck.) Imsh. in Brodo	M
4.	*Caloplaca malaensis* (Räsänen) Awasthi	M
5.	*Chrysothrix candelaris* (L.) Laudon	M
6.	*Dirinaria aegialita* (Afz. in Ach.) Moore	M
7.	*Lecanora cinereofusca* H. Magn.	M
8.	*L. pulicaris* (Pers.) Ach.	M, P
9.	*Leptogium austroamericanum* (Malme) Dodge	S
10.	*Parmelia praesorediosa* Nyl.	M
11.	*P. tinctorum* Nyl.	M, B
12.	*Pertusaria concinna* Erichsen	M
13.	*P. quassiae* (Feé) Nyl.	M
14.	*Physcia clementei* (Sm. in Sm. & Sow.) Lynge	M
15.	*Phaeographis albolabiata* Pat. & Kulk.	J

B: Bijrani, C: Chuhi, D: Dhikala, J: Jhirna, M: Malani, P: Paterpani, S: Sultan.

TABLE 3
LICHENS ON *MALLOTUS PHILIPPENSIS* IN CORBETT NATIONAL PARK

Sl. No.	Lichen species	Location
1.	*Bacidia nigrofusca* (Müll. Arg.) Zahlbr.	J
2.	*B. nigrosticta* Zahlbr.	B
3.	*Graphina* cfr. *dimorphodes* (Nyl.) Zahlbr.	P
4.	*Graphis nakanishiana* Pat. & Kulk.	P
5.	*Lecanora perplexa* Brodo	P
6.	*Pertusaria acuta* Müll. Arg.	M
7.	*Pyrenula albida* Müll. Arg.	B
8.	*P. brunnea* Feé	M
9.	*P. subrizalensis*	C

B: Bijrani, C: Chuhi, D: Dhikala, J: Jhirna, M: Malani, P: Paterpani, S: Sultan

foliose and six crustose. It shares two species with *Mallotus* and 4 with *Syzygium cumini* (Fig. 3).

CONCLUSION

The major conclusions that emerge from this study are as follows:

TABLE 4
LICHENS ON *MURRAYA KOENIGII* IN CORBETT NATIONAL PARK

Sl. No.	Lichen species	Location
1.	*Bacidia nigrofusca* (Müll. Arg.) Zahlbr.	J
2.	*Cryptothecia stirtonii* A.L. Smith	J
3.	*Dirinaria confluens* (Fr.) Awasthi	J
4.	*Lecanora perplexa* Brodo.	P
5.	*Lecanora xylophila* Hue	C
6.	*Parmelia saccatiloba* Taylor	P
7.	*Pertusaria acuta* Müll. Arg.	P
8.	*Pyrenula aspistea* (Ach.) Ach.	P

B: Bijrani, C: Chuhi, D: Dhikala, J: Jhirna, M: Malani, P: Paterpani, S: Sultan.

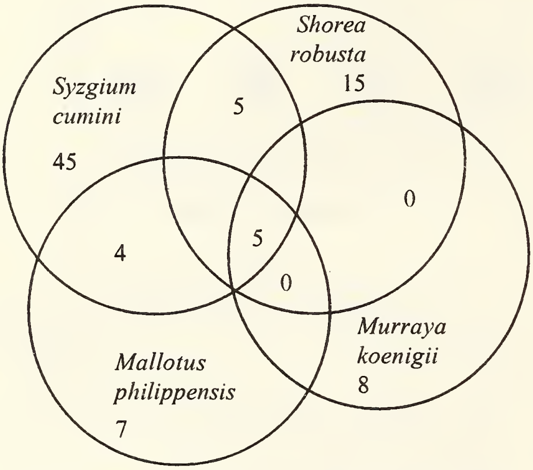

Fig. 3: Common epiphytic lichens species sharing different trees in Corbett National Park

■ In all the sites surveyed crustose lichens dominate, except at Malani, where only foliose lichens were found growing on decaying logs of *Shorea robusta.*

TABLE 5
LICHENS ON *MANGIFERA INDICA* IN CORBETT NATIONAL PARK

Sl. No.	Lichen species	Location
1.	*Bacidia medialis* (Tuck. in Nyl.) Zahlbr.	S
2.	*Pyrenula introducta* (Stirton) Zahlbr.	S

B: Bijrani, C: Chuhi, D: Dhikala, J: Jhirna, M: Malani, P: Paterpani, S: Sultan.

■ The Chuhi and Sultan areas are lichen-rich, having 26 and 20 species respectively, as both are moist, and shady sites with luxuriant growth of evergreen *Syzygium cumini* and *Mallotus philippensis.*

■ *Syzygium cumini* bears 23 epiphytic lichen species, followed by *Shorea roubsta, Murraya koenigii,* and *Mallotus philippensis* with 15, 8 and 7 species respectively.

■ *Mangifera indica* is preferred by some specific lichen species of pyrenocarpous genera.

■ *Terminalia arjuna* and *Toona ciliata* show poor growth of only a few lichen species.

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